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The Near-Death Experience of the Celtic Tiger

A Model-Driven Narrative from the European Sovereign Debt Crisis

This article narrates Ireland's recent odyssey from the pride and envy of Europe to kneeling supplicant through the eyes of an econometric model of the government bond market. The exercise suggests that, in essence, two developments triggered and propelled Ireland's drift towards sovereign default: first, the global financial crisis that drove Ireland into a severe recession with collapsing tax revenues and increasing unemployment; second, a gap between the post-2007 increase in sovereign default risk that can actually be linked to macroeconomic fundamentals and the much bigger increase in perceived risk reflected by high interest rates and communicated by the massive downgrades of Ireland's sovereign debt rating.

In an extraordinary turn of events, the euro area's fastest-growing and second-richest country in terms of per capita income became the first to petition the European Union for a bailout on 21 November 2010. An international financial rescue package of €90bn, almost 60 per cent of Ireland's 2010 GDP, was handed over by the troika of the European Commission, the European Central Bank and the International Monetary Fund in the form of a three-year loan. This finalised the transformation of the global financial crisis into a sovereign debt crisis, putting public finances and the market for government debt centre stage and presenting governments as the new villains. At the same time, it permitted the financial industry to drift out of the limelight.

A number of contributions discuss this transformation in general and Ireland's own recent economic and political ordeal in particular.¹ This paper attempts to add to and complement this debate from the perspective of an econometric

multi-country model. Evaluating the Irish experience against patterns derived from a wider set of industrial countries may allow us to obtain general insights into the dynamics of the European sovereign debt crisis.

The backdrop for our analysis is a recently advanced empirical model of the market for government bonds.² The current paper narrates Ireland's odyssey from the beginnings of the financial crisis to its sovereign debt crisis through the eyes of this quantitative model.

The empirical background

In essence, Gärtner and Griesbach³ attempt to quantify the model of the market for government bonds proposed by Romer.⁴ This simple two-equation model derives from ideas put forward by Calvo.⁵ It focusses on the interaction between the default risk and the interest rate and models this by means of two equations:

- When default risk increases, the market requests a higher risk premium, and the interest rate goes up;
- When the interest rate goes up, default risk increases.

Non-linearities in these equations may generate multiple equilibria in the market for government bonds. Equilibria are

1 Informative examples are S. Dellepiane, N. Hardiman: *Governing the Irish Economy: A Triple Crisis*, in: N. Hardiman (ed.): *Irish Governance in crisis*, Manchester 2012, Manchester University Press, pp. 83-109; N. Hardiman, A. Regan: *The politics of austerity in Ireland*, in: *Intereconomics*, Vol. 48, No. 1, 2013, pp. 9-14; K. Whelan: *Ireland's Sovereign Debt Crisis*, University College Dublin, UCD Centre for Economic Research Working Paper Series, WP11/09, May 2011.

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2 M. Gärtner, B. Griesbach: *Rating agencies, self-fulfilling prophecy and multiple equilibria? An empirical model of the European sovereign debt crisis 2009-2011*, University of St. Gallen, SEPS, Discussion Paper No. 2012-15.

3 Ibid.

4 D. Romer: *Advanced Macroeconomics*, 4th edition, McGraw-Hill Irwin, New York 2012, pp. 632-639.

5 See G.A. Calvo: *Servicing the public debt: The role of expectations*, in: *American Economic Review*, Vol. 78, No. 4, 1988, pp. 647-661; and D. Romer, op. cit.

affected by fundamentals that include government deficits and debt, income growth and the interest rate on risk-free assets. They may be stable or unstable. Unstable equilibria constitute thresholds beyond which a self-enforcing process of increasing default risk and rising interest rates may loom.

Gärtner and Griesbach⁶ modify the model with the following assumptions:

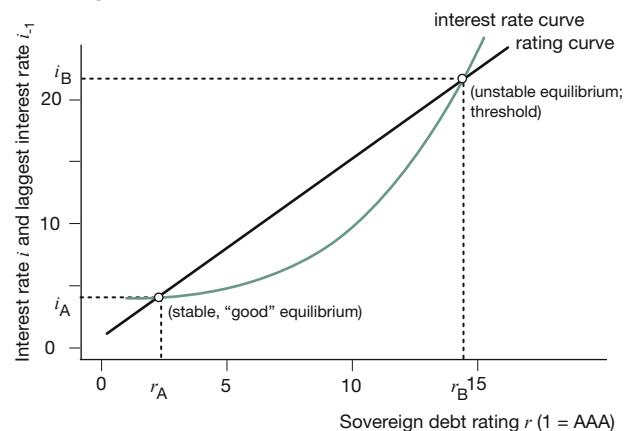
- The market uses sovereign debt ratings as a measure of default risk;
- Changes in the interest rate may affect default risk with a lag due to the long maturity of government debt titles.

Figure 1 displays estimates of the interest rate curve and the rating curve that result from panel regressions using annual data from 25 OECD countries for the period 1999–2011.⁷ The rating curve shows how, for a given set of fundamentals, interest rates affect ratings. The curve is linear in the segment covered by the data. The underlying equation explains some 60 per cent of the variations of ratings across time and among countries. Significant fundamentals that would shift the curve to the right if they deteriorate are mainly the deficit and primary deficit ratios and the public debt ratio, but also income levels and growth.

The interest rate curve is nonlinear, implying that successive downgrades have increasingly strong effects on the interest rate. The curve shifts up and down with the German interest rate, which serves as a proxy for the risk-free rate. The ratings raised to the third power explain 80 per cent of the variations in interest rates across countries and time. The curves are positioned using the sample means of fundamentals for the countries in the panel for the period under consideration. This constellation generates three equilibria. Two of them coincide with points of intersection of the two curves.

Point A is a “good” equilibrium with low interest rates and good ratings. It is locally stable because if a rating, for example, was erroneously set too high, this would drive up the interest rate, but not as much as actually required to justify the rating. Thus, the rating would eventually return to its (correct) initial value. Point B is an unstable equilibrium. Once the rating moves beyond the level associated with this point, it generates an increase in the interest rate that is so large that it requires further downgrades. We therefore enter a region

Figure 1
The empirical model



Source: M. Gärtner, B. Griesbach: Rating agencies, self-fulfilling prophecy and multiple equilibria? An empirical model of the European sovereign debt crisis 2009–2011, University of St. Gallen, SEPS, Discussion Paper No. 2012-15, Figure 5(b).

of self-fulfilling prophecy in which downgrades and interest rate hikes chase and reinforce each other. At the end of this process, default looms. This is the third, “bad” equilibrium in this scenario.

The situation of individual countries is likely to differ from this synthetic constellation based on sample means, because country-specific fundamentals must be used for positioning the rating curve. Depending on the relative position of the two curves, multiple equilibria may, but do not have to, arise. If the rating curve is located high (low) enough relative to the interest rate curve, only the good (bad) equilibrium may exist and be globally stable.

In this graphical display of the market for government bonds, the debt rating may change for two reasons. First, it may change because fundamentals change. This shifts the rating curve and changes the rating accordingly at any given interest rate. We may call this the “impact effect”. Second, because the interest rate changes, this causes the country to slide up or down a given rating curve.

This second effect, the “interest rate effect”, should be kept apart from the impact effect, because the interest rate is an endogenous variable that itself responds to downgrades and also because the effect is likely to take time. Increases in the interest rate affect the government’s budget only when bonds expire and/or new ones have to be issued that carry higher interest rates. The speed at which this happens depends on such things as the maturity structure of a country’s debt, the way in which expectations are formed, or the presence of such phenomena as bandwagon effects or herd behaviour. In Gärtner and Griesbach’s recursive model, this

⁶ M. Gärtner, B. Griesbach, op. cit.

⁷ The sample includes Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Poland, Portugal, South Korea, Spain, Sweden, Switzerland, the United Kingdom and the United States. The depicted equations are equation (1), table 2 and equation (4), table 3.

lagged response is captured parsimoniously by making ratings dependent on the previous year's interest rate.⁸ This effect via the interest rate can occur if at least one of the two conditions holds: either we are not operating on the horizontal segment of the interest curve or the risk-free rate, which positions the interest curve, changes.

In the next section, the discussion of Ireland's experience focusses on fundamentals and the impact effect that these have on ratings and interest rates. The section on caveats below shows that this is justified since the results do not differ to any relevant extent from the ratings we obtain by including the interest rate effect or even from looking at the full equilibrium effects.

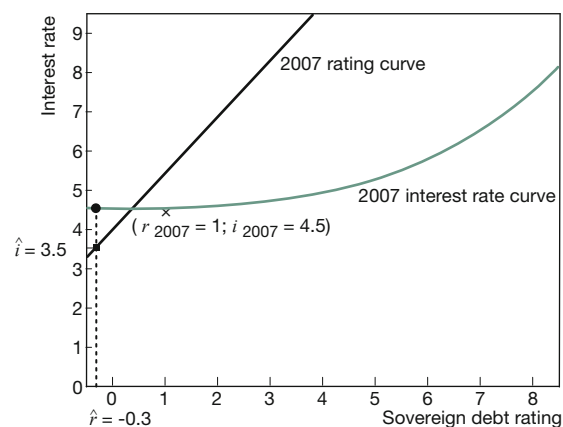
The Irish odyssey

We now turn to Ireland's development from its pre-crisis comfort zone to the scary days of near bankruptcy, rising unemployment, falling living standards, and an exodus of capital and young minds.⁹ The empirical model and graph described in the previous section serve as an organising device, and the focus is on the variables that drive this model. As in Gärtner and Griesbach,¹⁰ the ratings used are Fitch's ratings mapped onto a numerical scale that increases from 1=AAA to 21=D.

2007: "AAA+" with a positive outlook

After two decades of reforms and relentless stabilisation efforts, Ireland had managed to reduce its public debt from 110 per cent of GDP in 1987 to 25 per cent in 2007, the lowest in the euro area, bar Luxembourg and Slovenia.¹¹ Per capita income was among the highest in Europe at €43,500, as were income growth rates, which averaged 5.6 per cent between 2000 and 2007. The government budget, which had never violated the Maastricht deficit ratio threshold of three per cent, was marginally positive at 0.1 per cent of GDP.¹² The interest rate on Irish government bonds stood at a comfortable level of 4.5 per cent, and the country continued to enjoy a AAA rating from all three major rating agencies – from Fitch Ratings and Moody's since 1998 and from Standard & Poor's since 2002, the year that saw the completion of the introduction of

Figure 2
Ireland in 2007



Source: Authors' calculations based on estimates in M. Gärtner, B. Griesbach: Rating agencies, self-fulfilling prophecy and multiple equilibria? An empirical model of the European sovereign debt crisis 2009-2011, University of St. Gallen, SEPS, Discussion Paper No. 2012-15, Figure 5(b).

the euro, which Ireland had adopted as one of the first-wave countries.

By placing Ireland into the context of the empirical model of the market for sovereign bonds, Figure 2 shows four things:

- Ireland's current interest rate and rating curves. These use the coefficients reported by Gärtner and Griesbach,¹³ derived from data for 25 OECD countries over the time period 1999-2011, and are positioned by inserting Ireland's own fundamentals for the year 2007.
- Ireland's 2007 interest rate and rating according to the model (indicated by the black dot). The rating is obtained by extending a horizontal line from the 2006 interest rate, which stood at 3.5 per cent, from the ordinate to the right and finding its intersection with the rating curve. The 2007 interest rate is obtained by extending a vertical line from the identified 2007 credit rating upwards to the interest rate curve.
- Ireland's long-run equilibrium implied by the 2007 fundamentals. This is determined by the intersection of these two curves. This point indicates the levels towards which, as long as the fundamentals remain unchanged, the government bond yields and sovereign debt ratings should eventually converge in order to fit the experience of all the countries and years in the sample.
- Ireland's actual government bond yields and sovereign debt ratings in 2007, indicated by an "x".

8 Ibid.

9 See Bloomberg: Capital Flight Leaves Banks in Germany Awash in Deposits, 8 June 2012, available at <http://www.bloomberg.com/news/2012-06-07/capital-flight-leaves-banks-in-germany-awash-in-cheap-deposits.html>. Already in 2009, capital flight reached about €120bn according to R. Neubäumer: Eurokrise: Keine Staatsschuldenkrise, sondern Folge der Finanzkrise, in: Wirtschaftsdienst, Vol. 91, No. 12, 2011, p. 830. In terms of emigration, see N. Hardiman, A. Regan: The politics of austerity in Ireland, op. cit., p. 12.

10 M. Gärtner, B. Griesbach, op. cit.

11 Source: World Economic Outlook Database, April 2012.

12 The main source for the data reported and discussed in this paper is the OECD Economic Outlook No 90 database.

13 M. Gärtner, B. Griesbach, op. cit.

There is no noteworthy discrepancy between Ireland's actual experience and the prediction of the model. The actual interest rate matches the model's interest rate almost perfectly. The fundamentals would have justified an even better rating of -0.3. However, this would burst the bounds of Fitch's rating scale, which ends at AAA (=1). This gap of -1.3 rating classes could be seen as a cushion, a protective buffer for the country's top rating, should fundamentals deteriorate in future years.

2008: When Lehman Brothers collapsed and money markets froze

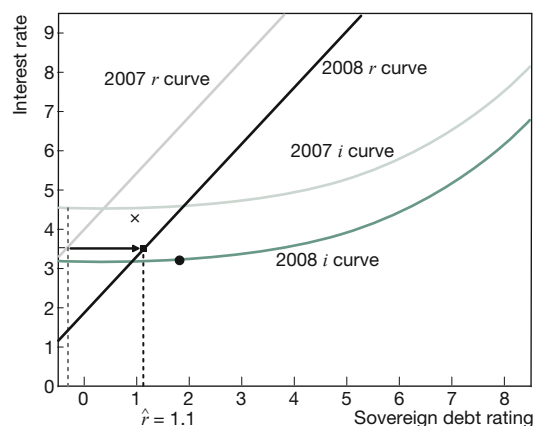
This was the year when the global real estate and financial crisis erupted in full force. The bankruptcy of Lehman Brothers, the fourth-largest investment firm in the United States at the time, sent shivers around the globe. In Ireland, a number of those variables that the econometric model identifies as key determinants of a sovereign's solvency, as measured by its credit rating, changed for the worse, moving the rating curve to the right (see Figure 3). Here, dark curves depict the current year. Light-coloured curves depict the previous year to help visualise the change that occurred.

The first repercussions of uncertainty and panic in the financial markets and of the bursting housing bubble were felt in the labour market, as unemployment rose from 4.6 per cent to 6.1 per cent. At the same time, Ireland's GDP shrank by three per cent. In September, Ireland became the first euro area country declared to be in recession. However, Ireland was still able to obtain credit in the financial markets, even at a slightly lower interest rate of 4.3 per cent compared with 4.5 per cent in 2007. But since German government bond yields, taken as a proxy for the risk-free rate, had fallen from 4.5 per cent in 2007 to 3.2 per cent, pushing the interest rate down, Irish rates should have fallen still further. However, this gap is small. It suggests that even after the global scare triggered by Lehman Brothers' insolvency, government bonds were still considered safe investments both at the centre and on the fringes of the euro area.

In an attempt to safeguard the nation's banking system after the collapse of Lehman Brothers, but arguably sowing disaster for years to come, the government announced an unconditional guarantee of €440bn for more or less all liabilities of Ireland's major banks. While considered bold and unavoidable at the time, it is quite possible that Ireland would have taken an entirely different path without this step.

The combined effect of all the relevant deteriorations of fundamentals increased Ireland's insolvency risk to an extent that would have called for an immediate downgrade of its sovereign debt rating by 1.4 notches. This is how far the rating curve shifted to the right. About two-thirds of this shift

Figure 3
Ireland in 2008



Source: Authors' calculations based on estimates in M. Gärtner, B. Griesbach: Rating agencies, self-fulfilling prophecy and multiple equilibria? An empirical model of the European sovereign debt crisis 2009-2011, University of St. Gallen, SEPS, Discussion Paper No. 2012-15, Figure 5(b).

could be attributed to the erosion of government finances. Half of this, in turn, was caused by an increase in the primary deficit ratio, which rose to six per cent. The other half was due to the debt ratio leaping from 28.75 per cent to 49.6 per cent. No other included fundamental variable had an impact that contributed to more than ten per cent of the required downgrade.

Two factors drove the government budget deep into the red. The first and major one is the collapse of tax revenues. As in many other countries, the negative real effects of the financial crisis on economic activity resulted in a substantial loss in tax revenues and an increase in social welfare spending. The effects on taxes were *aggravated* by the fact that a redesign of the tax system during the boom years had reduced the share of income-based tax revenues and increased the share of asset-based tax revenues. Since the latter are not levied on property or wealth but paid as a stamp tax only when residential property is purchased, they dropped sharply when the building industry screeched to a halt. A second negative budget effect resulted from increased social welfare outlays. Besides the €6.4bn drop in tax revenues and a €2.9bn increase in social welfare spending, the main contributor to the €13bn deficit that accumulated during the first recession year was triggered by a 64 per cent increase in net capital outlays compared to the previous year.¹⁴ Combined with some €20bn that the government had raised but

¹⁴ The change of the net capital outlay of the government is mainly driven by the capital transfers paid and other capital payments, which increased by 77 per cent with respect to the previous year in value terms.

put aside for the promised future support of ailing banks, the 7.3 per cent deficit ratio jolted the public debt-to-GDP ratio to 49.6 per cent.

While the movement of all the predetermined variables in the year when the financial crisis erupted would have justified a downgrade of Irish sovereign debt by 1.4 notches, as mentioned above, Fitch Ratings retained its AAA rating (as did Moody's and Standard and Poor's). Since the suggested 1.4 notches match the buffer that Ireland's AAA rating had inherited from 2007, the top rating in 2008 is fully justified, reflecting the country's fundamentals almost perfectly.

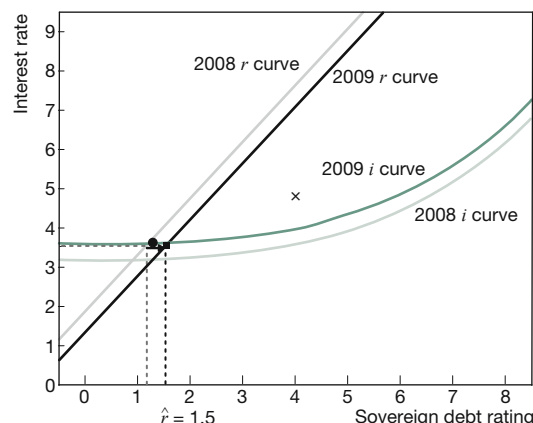
2009: The year everything changed

By 2009, the financial crisis was felt in many parts of the real economy. While the recession had started in 2008 and had already been officially declared, it was now in full force. Income plunged by another seven per cent and caused the unemployment rate to almost double from 6.1 per cent to 11.8 per cent. Inevitably, this caused tax revenues to recede still further, by another €7.5bn, which raised net borrowing to €28.7bn or 13.9 per cent of GDP for the year and pushed the debt ratio up to 64.8 per cent.

While there had still not been any significant and sustained move in the interest rates on Irish government bonds, rating agencies issued their first credit warnings as early as spring. Fitch Ratings put Ireland on a negative watch on 6 March. It is not without irony that Fitch Ratings justified this action by "a slump in government tax revenue", to which – via the global recession triggered by the financial crisis – rating agencies were major contributors.¹⁵ Fitch Ratings downgraded Ireland a month later by one notch to AA+ and again on 4 November by another two notches to a AA rating.¹⁶

As Figure 4 reveals, the empirical model is unable to trace these downgrades. The negative repercussions of the financial crisis for the Irish economy shifted the rating curve to the right by less than half a notch. Most of this impact effect can be linked to the significant increase in the country's debt ratio and dropping income levels. However, an almost matching effect in the opposite direction came from the disappearance of inflation with its positive consequences for the country's competitiveness. Measured against these combined effects, at a virtually unchanged interest rate, the negative watch that

Figure 4
Ireland in 2009



Source: Authors' calculations based on estimates in M. Gärtner, B. Griesbach: Rating agencies, self-fulfilling prophecy and multiple equilibria? An empirical model of the European sovereign debt crisis 2009–2011, University of St. Gallen, SEPS, Discussion Paper No. 2012-15, Figure 5(b).

Fitch Ratings issued for Ireland, interpreted as a downgrade by half a notch, appears justified, though at the end of the year rather than in March. The actual downgrade by a full three notches must be termed excessive when measured against what the econometric model suggests.

2010: Rien ne va plus

During this year the situation went from bad to worse. This was not so much the case for the real economy, in which the recession appeared to bottom out with another (modest) contraction of 0.4 per cent, accompanied by a further rise in the unemployment rate to 13.7 per cent. The real shocker was an unprecedented government budget deficit of 31.3 per cent, which pushed the debt ratio to 98.5 per cent – well beyond the once famous and now infamous 90 per cent threshold.¹⁷ The main contributor to this eye-watering

15 Bloomberg: Ireland May Lose Its AAA Credit Rating, Fitch Says (Update3), 6 March 2009, available at <http://www.bloomberg.com/apps/news?pid=21070001&sid=azL2C1io0Hbg>.

16 While we focus on Fitch's ratings here, as these are used in M. Gärtner, B. Griesbach, op. cit., it is worth noting that Fitch Ratings' downgrades of Ireland were preceded by Standard & Poor's actions. Standard & Poor's had changed Ireland's outlook to negative on 9 January 2009 and was the first agency to start actual downgrades on 30 March, when it lowered Ireland's rating to AA+.

17 In a highly influential paper that seemed to provide the intellectual and empirical underpinnings for austerity policies, C.M. Reinhart, K.S. Rogoff: Growth in a time of debt, in: *American Economic Review*, Vol. 100, No. 2, 2010, pp. 573–578, suggested that there was a threshold in the government debt-to-GDP ratio at the 90 per cent mark beyond which income growth turns negative. Scrutinising their work, T. Herndon, M. Ash, R. Pollin: Does High Public Debt Consistently Stifle Economic Growth? A Critique of Reinhart and Rogoff, University of Massachusetts Amherst, Political Economy Research Institute showed that once data omissions, weighting oddities and coding errors are taken into account, this threshold becomes a mirage. For a non-technical summary of the controversy triggered by this criticism, see J. Cassidy: The Reinhart and Rogoff controversy: A summing up, in: *The New Yorker*, 29 April 2013, available at <http://www.newyorker.com/online/blogs/johncassidy/2013/04/the-rogooff-and-reinhart-controversy-a-summing-up.html>.

number was €31bn in aid to the distressed banking sector.¹⁸ While the government's plan was to spread the cost of this support over a decade, EU accounting rules required the full amount to be included in Ireland's 2009 budget calculations.

Figure 5 shows that in 2010 Ireland completely deviated from the patterns derived from the past and from other countries. Further deterioration of the fundamentals shifted the rating curve to the right by another 0.7 notches, suggesting a AA+ rating, one notch below AAA. This shift was almost entirely due to the exploding debt ratio. The deficit also contributed to this, but its effect was mostly reversed by the first signs of improvement in the primary deficit. However, while the established patterns recommended an AA+ rating, well within investment grade territory, Fitch Ratings bestowed on the country a BBB+ rating, which is a full six notches worse than AA+. The rationale given for the downgrade was:

The downgrade reflects the additional fiscal costs of restructuring and supporting the banking system (...); weaker prospects and greater uncertainty regarding the economic outlook as a result of the recent intensification of the financial crisis; and the associated loss of access to market funding at an affordable cost (...).¹⁹

Therefore, it is again the recession and the ailing banking system, plus (and here some circularity creeps into the argument) the rising interest rates that the Irish government faces in the bond market, which of course are at least partly driven by the ratings, as Gärtner and Griesbach²⁰ show.²¹

The model's impact response to this downgrade would have been an increase in Ireland's interest rate to about 6.5 per cent. The actual response was even stronger, with the interest rate surging to 9.1 per cent by the end of 2010. This "overshooting" of the interest rate is actually in line with the additional results presented by Gärtner and Griesbach,²² which go beyond the baseline version used here.²³ These results suggest that any downgrade, perhaps by disquieting markets, triggers a short-term overreaction of interest rates

18 In total, the bank recapitalisation requirements ultimately summed up to about €70bn after a series of ever increasing estimates starting from €5.5bn in autumn 2008. See S. Dellepiane, N. Hardiman, *op. cit.*, p. 100.

19 CPI Financial: Fitch downgrades Ireland to "A+"; outlook negative. 7 October 2010, available at http://www.thefreelibrary.com/_/print/PrintArticle.aspx?id=238897987.

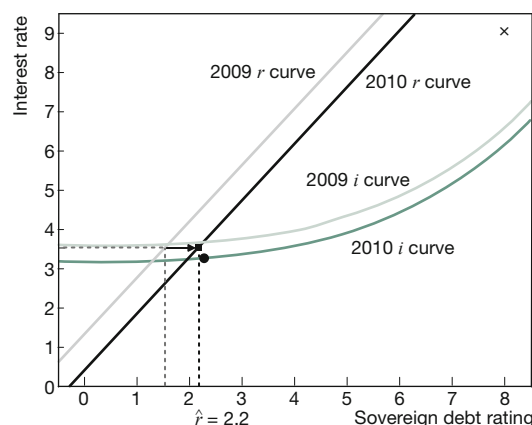
20 M. Gärtner, B. Griesbach, *op. cit.*

21 According to the results presented by M. Gärtner, B. Griesbach, F. Jung: PIGS or Lambs? The European Sovereign Debt Crisis and the Role of Rating Agencies, in: *International Advances in Economic Research*, Vol. 17, No. 3, 2011, pp. 288-299, even rating changes that statistical methods cannot link to changes in fundamentals, and thus may appear erroneous or arbitrary, exert a significant influence on interest rates.

22 M. Gärtner, B. Griesbach, *op. cit.*

23 See Table 4 in M. Gärtner, B. Griesbach, *op. cit.*

Figure 5
Ireland in 2010



Source: Authors' calculations based on estimates in M. Gärtner, B. Griesbach: Rating agencies, self-fulfilling prophecy and multiple equilibria? An empirical model of the European sovereign debt crisis 2009-2011, University of St. Gallen, SEPS, Discussion Paper No. 2012-15, Figure 5(b).

by about 0.8 percentage points per notch.²⁴ Given that Fitch Ratings downgraded Ireland by four notches, this roughly accounts for the vertical discrepancy between the actual interest rate and the rating curve.

The year ended with a bang when, on 21 November, Ireland became the first country to ask for an international bailout. The reason was that the government had dramatically underestimated the risks hidden in Irish banks, for which it had issued an unconditional guarantee in 2008.

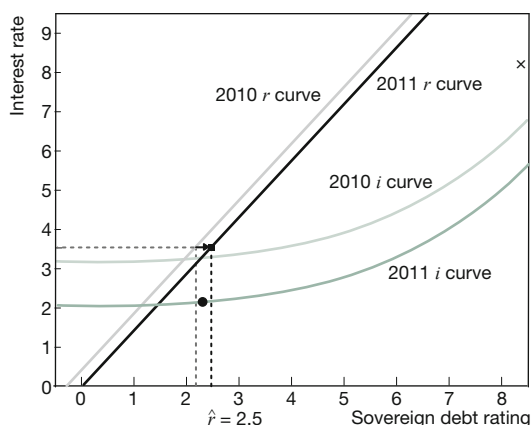
2011: Light at the end of the tunnel?

This year's silver lining was the return of income growth. However, at 1.2 per cent it remained but a shadow of the growth to which Ireland had become accustomed during its tiger years. Additionally, it was not enough to prevent the unemployment rate from creeping up still further, to 14.4 per cent. The government's budget deficit remained well in the double digits (13.4 per cent), pushing the debt ratio to 117.6 per cent. The achievements of 20 years of economic reforms, budgetary discipline and consensus building had been lost in as little as four years. On the positive side, the primary balance continued to improve to -3.6 per cent of potential GDP.

The aggregate effect of these mixed movements of fundamentals was another small shift of the rating curve to the

24 There appears to be no symmetry in this effect. While downgrades are found to push the market into a panic mode, in which interest rates overreact, there is no comparable response when a sovereign is upgraded. See M. Gärtner, B. Griesbach, *op. cit.*, Table 4, equation (8).

Figure 6
Ireland in 2011



Source: Authors' calculations based on estimates in M. Gärtner, B. Griesbach: Rating agencies, self-fulfilling prophecy and multiple equilibria? An empirical model of the European sovereign debt crisis 2009-2011, University of St. Gallen, SEPS, Discussion Paper No. 2012-15, Figure 5(b).

right by 0.3 notches (Figure 6). The actual rating remained at BBB+, 5.5 notches worse than suggested by the econometric model.²⁵ The interest rate receded by 0.9 percentage points to 8.2 per cent, but this may have been led by the drop in the risk-free (i.e. German) rate from 3.3 per cent to 2.1 per cent. All in all, in terms of risk perception and the interest rate it paid on new debt, Ireland was still far away from where it should have been according to the patterns derived from the entire data set.

²⁵ This did not make for a calm year on the rating front. Standard & Poor's downgraded Ireland in three steps from A to BBB+, with a negative watch, and the rating by Moody's was lowered from Baa1 to Baa3 to Ba1.

Table 1
Predicted versus actual ratings

Year	Fundamentals only (impact effect)	Ratings predicted by model using:			Actual ratings (end of year) ¹		
		Fundamentals and the predicted interest rate	Fundamentals and their long-run equilibrium effect	Fundamentals and the actual interest rate	Fitch	Moody's	Standard & Poor's
2007	-0.3	-0.3	0.4	-0.3	1 (AAA; os)	1 (Aaa; os)	1 (AAA; os)
2008	1.1	1.8	0.9	1.5	1 (AAA; os)	1 (Aaa; os)	1 (AAA; os)
2009	1.5	1.3	1.6	2.2	4 (AA-; os)	2.5 (Aa1; on)	4.5 (AA; on)
2010	2.2	2.3	1.9	3.3	8 (BBB+; os)	8.5 (Baa1; on)	6.5 (A; wn)
2011	2.5	2.3	1.5	4.2	8.5 (BBB+; wn)	11.5 (Ba1; on)	8.5 (BBB+; wn)

¹ os = outlook stable; on = outlook negative; wn = watch negative. We translated negative outlook or watches into an 0.5 add-on in the numerical scale.

Source: Authors' calculations based on estimates in M. Gärtner, B. Griesbach: Rating agencies, self-fulfilling prophecy and multiple equilibria? An empirical model of the European sovereign debt crisis 2009-2011, University of St. Gallen, SEPS, Discussion Paper No. 2012-15, Figure 5(b).

Caveats

Our discussion of Ireland's crisis years (2007-2011) focussed on what we may call the "impact effect" of fundamentals on sovereign debt ratings. Technically, we looked at the horizontal shifts of the rating curve as the core driver of a country's debt rating. Table 1 summarises this development in column 2, repeating that in 2011 Ireland should have been dealt a 2.5 rating, which translates to an AA+ label with a negative watch. This contrasts sharply not only with Fitch's ratings already discussed in the text and displayed in column 6 but also with the ratings issued by Moody's and Standard & Poor's. In the case of Moody's, the gap between the prediction of the empirical model and the actual sovereign debt rating in 2011 is an astounding nine rating classes.

As mentioned above, the exclusive focus on the impact effect of fundamentals on default risk, which ignores indirect effects via the interest rate, may underestimate the required downgrade. The extent to which this happens is an empirical question. Hence, columns 3 and 4 look beyond the impact effect. Column 3 reports the ratings that result when, instead of keeping it constant, the interest rate is updated every year with the endogenous prediction of the model. This dynamic simulation yields the short-run equilibria marked as black dots in Figures 2-6. As column 3 shows, there is a single year, 2008, during which this approach justifies a rating inferior to the rating derived from the impact effect.

Column 4 takes one step further and looks at the long-run equilibrium values, defined by the points of intersection between the interest rate and the rating curves in Figures 2-6. According to these equilibria, or longer-run gravitation points, the ratings should have been even better than those traced by the impact effects.

Finally, column 5 steps outside the model. The thought experiment conducted here treats interest rates as an exogenous variable. The question asked is whether the actually observed increases in the interest rate, even if they cannot be tracked by the empirical model, would have justified the actual downgrades.²⁶ While the explosion of Irish interest rates in 2010 and 2011, taken as an exogenous event, would indeed have justified a downgrade to AA-, even this rating falls far short of the actual ratings, and a gap of four to seven rating classes remains unexplained.

Summary and conclusions

Our quantitative exercise reveals and underscores a number of insights regarding Ireland's recent struggle. However, many of these apply to other countries on the periphery of the euro area as well, and to Europe's sovereign debt crisis years at large:

- The main trigger and driving force behind the budget and debt problems in many European countries and beyond is the financial crisis that erupted in 2008 and the havoc it played with government revenues and spending. The labels "sovereign debt crisis" and "euro crisis" that have been applied to these developments are misnomers.²⁷ Their uncritical adoption by wider circles in academia, the media and – rather strangely – politicians, despite easily accessible evidence to the contrary, remains a puzzle. Future research, preferably with an interdisciplinary approach, will have to explore the mechanisms that were at work. As an immediate effect, this mislabelling has led many of the recent discussions and policy efforts in the wrong direction, while insufficient attention is being paid to the issues that caused and fuelled the financial crisis in the first place.
- Related to the previous point, the Irish experience underscores that the mantra-like reference to governments or countries "living beyond their means" is equally misleading. If there ever was a country in recent history that showed the determination and resourcefulness, and mustered the political consensus, to deal with debt levels that were considered excessive, it was Ireland. However, bringing the debt level down from 110 per cent to 25 per cent of GDP, near the very low end of the European spectrum, in two decades was still not enough to soothe finan-

cial markets and protect the country from becoming a collateral victim of the financial crisis. Given this experience, it is difficult to understand how austerity could ever have acquired the status of a "miracle pill", the ultimate safeguard against diseases originating from financial markets.

- Projected against an empirical model that explains the interaction between sovereign debt ratings and government bond yields, and how this is related to the economy at large, since the turn of the millennium in a group of core OECD countries, the negative effects of the financial crisis on incomes and government finances should never have triggered the massive upheaval in the market for government bonds that occurred.
- Ireland's treatment by the leading rating agencies was conspicuously outside the empirical pattern that can be derived from historical data. While we will probably never know what would have happened without these excessive downgrades and the apparent hyperactivity of the rating agencies with respect to sovereigns, such deviations have the potential to play an unfortunate role in a market in which multiple equilibria loom and any bad news, justified or not, may trigger crises and initiate self-propelling developments towards insolvency.
- Many factors contributed to the metamorphosis of the global financial crisis into what is now called the sovereign debt crisis. A number of these may be country-specific. The list often mentioned in the case of Ireland, for example, includes an ill-designed industrial policy, the housing bubble, an oversized banking sector, a lopsided tax system and questionable crisis management. Different lists, with overlaps, are offered for Greece, Italy, Portugal and Spain. It would be implausible to deny such idiosyncratic factors. However, the common factors linking the experiences of many countries on Europe's periphery are distorted developments and panic reactions in the financial markets, both as an initial trigger and as a propagating mechanism once the crisis was under way – with far-reaching political implications. This is the wider lesson from the Celtic Tiger play offered here, and this is what policymakers need to address urgently. The European Commission took first steps with its new Directive 2013/14/EU, which is aimed at strengthening the regulatory framework of credit rating agencies.²⁸

26 Another way to look at this exercise is to use actual interest rates rather than the ones generated by the empirical model. Then we open the door for self-fulfilling prophecy to become part of the "explanation". When a downgrade, even if not justified by fundamentals, raises the interest rate, it may generate (part of) its own justification.

27 This insight is not really new but begs to be repeated. For an early, comprehensive argument in this direction see R. Neubäumer, op. cit.

28 European Commission: Stricter rules for credit rating agencies to enter into force, Press Release, IP/13/555, Brussels, 18 June 2013. For a detailed discussion see e.g. B. P a u d y n: Credit rating agencies and the sovereign debt crisis: Performing the politics of creditworthiness through risk and uncertainty, in: Review of International Political Economy, Vol. 20, No. 4, 2013, pp. 788-818. A brief comparison with the 2010 Dodd-Frank Act in the USA is done by K. L a n n o o: Rate the Rating Agencies!, in: Intereconomics, Vol. 46, No. 5, 2011, pp. 246-247.